Produkte
Products

TÜVRheinland®

Prüfbericht-Nr.: *Test Report No.:*	**17042721 001**	**Auftrags-Nr.:** *Order No.:*	164018202	Seite 1 von 28 *Page 1 of 28*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	17.07.2014	
Auftraggeber: *Client:*	LENOVO CHINA. / Lenovo (Beijing) Limited. No.6 Chuang Ye Road, Shangdi Information Industry Base, Haidian District, Beijing			
Prüfgegenstand: *Test item:*	Lenovo Smartband			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	SW-B100			
Auftrags-Inhalt: *Order content:*	FCC Certification and Verification			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 15: Subpart C Section 15.107 CFR47 FCC Part 15: Subpart C Section 15.109 RSS-210 Issue 8 December 2010 RSS-Gen Issue 3 December 2010 RSS-102 Issue 4 March 2010			
Wareneingangsdatum: *Date of receipt:*	27.07.2014			
Prüfmuster-Nr.: *Test sample No.:*	A000094459--001			
Prüfzeitraum: *Testing period:*	29.07.2014 - 04.09.2014			
Ort der Prüfung: *Place of testing:*	Shenzhen Accurate Technology Co., Ltd.			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: *Test result*:*	Pass			

geprüft von / *tested by:*

Datum / *Date*	Name / Stellung / *Name / Position*	Unterschrift / *Signature*
10.09.2014	Owen Tian / Senior Project Manager	

kontrolliert von / *reviewed by:*

Datum / *Date*	Name / Stellung / *Name / Position*	Unterschrift / *Signature*
16.09.2014	Winnie Hou / Technical Certifier	

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 PEAK OUTPUT POWER
RESULT: Passed

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Passed

5.1.4 -6DB BANDWIDTH
RESULT: Passed

5.1.5 99% BANDWIDTH
RESULT: Passed

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.1.7 SPURIOUS EMISSION
RESULT: Passed

5.1.8 CONDUCTED EMISSIONS
RESULT: Passed

5.1.9 RADIATED EMISSION
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix 1: Test Result

2. Test Sites

2.1 Test Facilities

Shenzhen Accurate Technology Co., Ltd.

F1, Bldg. A, Changyuan New Meterial Port, Keyuan Rd., Science & Industry Park Nanshan District, Shenzhen 518057, P.R. China

FCC Registration No.: 752051

The tests at the test site have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Spurious emission and Radiated emission				
Signal Generator	Rohde&Schwarz	SMT03	100059	2015-01-11
Voltage Probe	Rohde&Schwarz	URV5-Z2	100012	2015-01-11
Voltage Probe	Rohde&Schwarz	URV5-Z2	100013	2015-01-11
Field Probe	ETS	HI-6005	121578	2015-01-11
Power Amplifier	AR	250W1000A	335304	2015-01-11
Power Amplifier	MILMEGA	AS0860-75/45	1040084	2015-01-11
Power Meter	Rohde & Schwarz	NRVD	100041	2015-01-11
Broadband antenna	CHASE	CBL6111C	2576	N/A
Horn Antenna	AR	AT4002A	305754	N/A
Radio Test Suite				
Receiver	Rohde & Schwarz	ESCS30	100307	2015-01-11
Conducted Emission				
Test Receiver	Rohde & Schwarz	ESCS30	100307	2015-01-11
L.I.S.N.	Schwarzbeck	NLSK8126	8126431	2015-01-11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100815	2015-01-11
50Ω Coaxial Switch	Anritsu Corp	MP59B	6200283933	2015-01-11

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix1 of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Shenzhen Accurate Technology Co., Ltd. test facility located at F1, Bldg. A, Changyuan New Meterial Port, Keyuan Rd., Science & Industry Park Nanshan District, Shenzhen 518057, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a wearable device (wrist band) with Bluetooth low energy technology.

3.2 Ratings and System Details

Table 2: Rating of EUT

Kind of Equipment:	Lenovo Smartband
Type Designation:	SW-B100
FCC ID	A5MSWB100
IC	5903G-SWB100

Table 3: Technical Specification of EUT

Technical Specification	Value
Operating Frequency band	2402 – 2480 MHz
Bluetooth Core Version	4.0 Single mode
Channel separation	2MHz
Extreme Temperature Range	-20ºC to +55ºC
Operation Voltage	DC3.7V via lithium Battery
Modulation	GFSK
Antenna Type	Internal Antenna, Non-User Replaceable
Antenna Gain	0.03dBi
RF Output Power	0.00179W (2.54dBm)

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Bluetooth Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Charging
C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Technical Description
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.4: 2003.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested with following accessories

Description	Manufacturer	Type	S/N
Notebook	Lenovo	ThinkPad X240	N/A
Printer	HP	HP laseriet 1015	CNFG030424
Mobile Phone	Lenovo	LENOVO K910	N/A

4.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

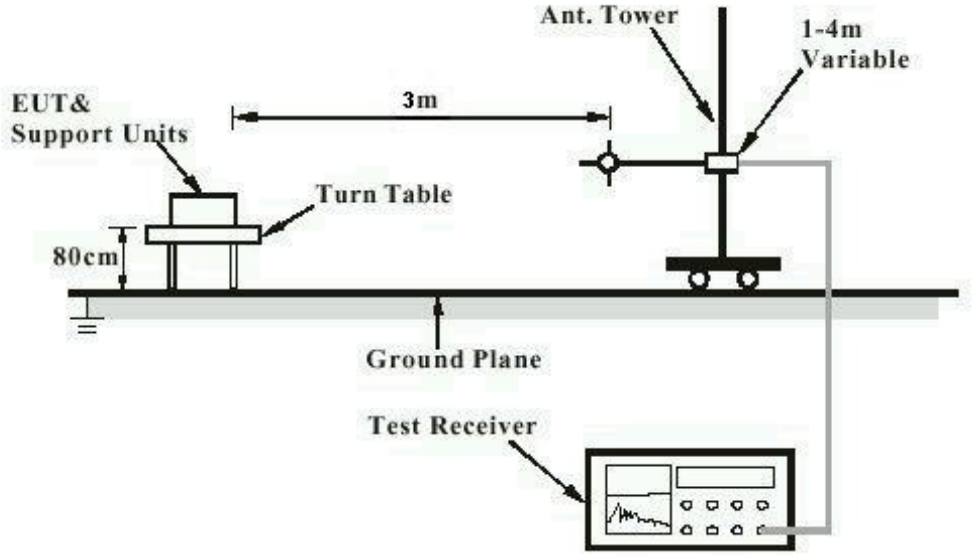


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement

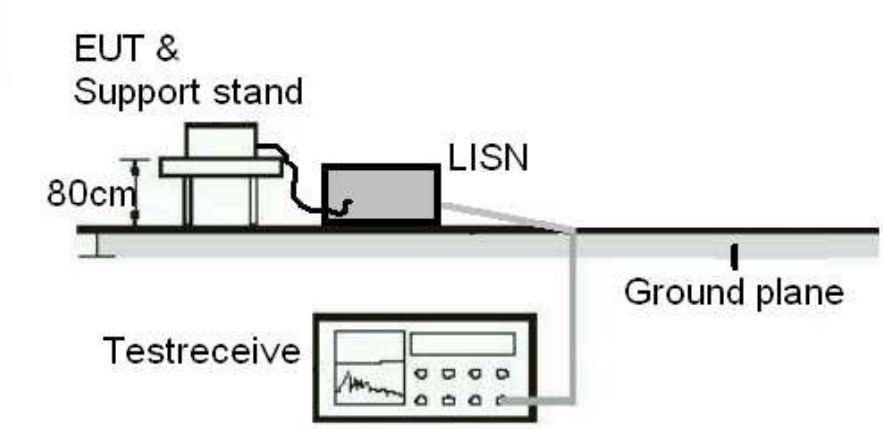
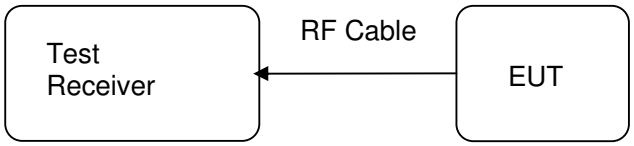


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2014-07-29
Test standard	:	FCC Part 15.247(b)(4) and Part 15.203 RSS-Gen 7.1.4
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 0.03dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT photo for details.

5.1.2 Peak Output Power

RESULT: **Passed**

Test date	:	2014-07-29
Test standard	:	FCC Part 15.247(b)(3) RSS-210 A8.4 (4)
Basic standard	:	ANSI C63.4: 2003
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

Table 4: Test result of Peak Output Power

Channel	Channel Frequency (MHz)	Peak Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	-2.01	0.00063	1
Middle Channel	2440	2.54	0.00179	1
High Channel	2480	-3.80	0.00042	1

5.1.3 Conducted Power Spectral Density

RESULT: **Passed**

Test date	:	2014-07-29
Test standard	:	FCC Part 15.247(e) RSS-210 A8.2 (b)
Basic standard	:	ANSI C63.4: 2003
Limit	:	8dBm/3kHz
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

Table 5: Test result of Peak Output Power

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2402	-14.65	8
Middle Channel	2440	-16.15	8
High Channel	2480	-17.44	8

5.1.4 -6dB Bandwidth

RESULT: **Passed**

Date of testing	:	2014-07-29
Test standard	:	FCC Part 15.247(a)(2) RSS-210 A8.2 (a)
Basic standard	:	ANSI C63.4: 2003
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

Table 6: Test result of 20dB Bandwidth

Channel	Channel Frequency (MHz)	-6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	666	500	Pass
Mid Channel	2440	666	500	Pass
High Channel	2480	654	500	Pass

5.1.5 99% Bandwidth

RESULT: **Passed**

Date of testing	:	2014-07-29
Test standard	:	RSS-Gen clause 4.6.1
Basic standard	:	ANSI C63.4: 2003
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

Table 7: Test result of 99% Bandwidth

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2402	1050	/	Pass
Mid Channel	2441	1044	/	Pass
High Channel	2480	1074	/	Pass

5.1.6 Conducted spurious emissions measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2014-07-30
Test standard	:	FCC part 15.247(d) RSS-210 A8.5
Basic standard	:	ANSI C63.4: 2003
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shield room

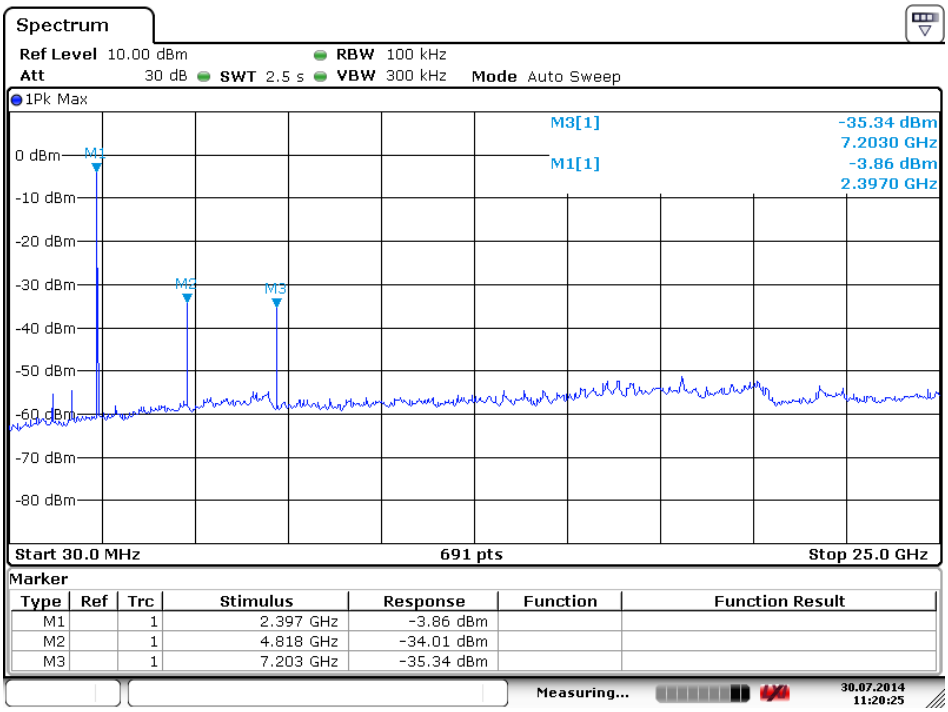
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.

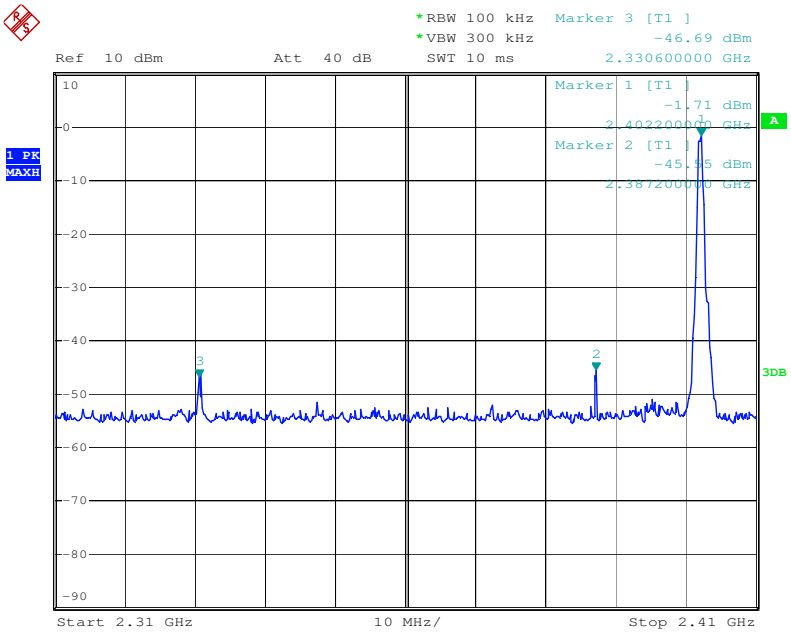
Test Plot of 100kHz Bandwidth of Frequency Band Edge

Low Channel



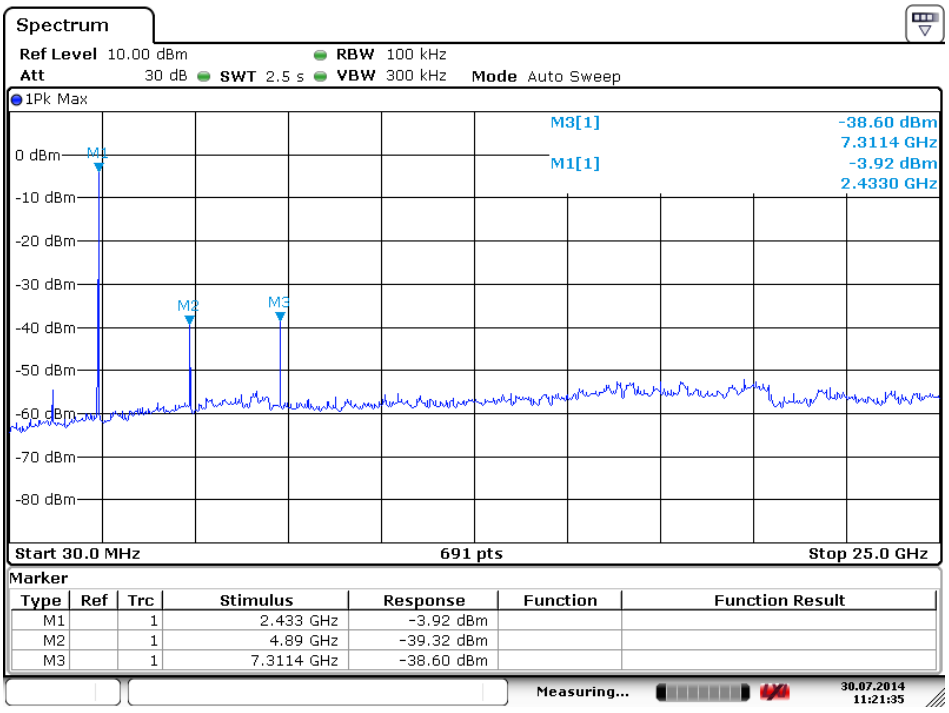
Date: 30.JUL.2014 11:20:25

Low Channel, Band Edge



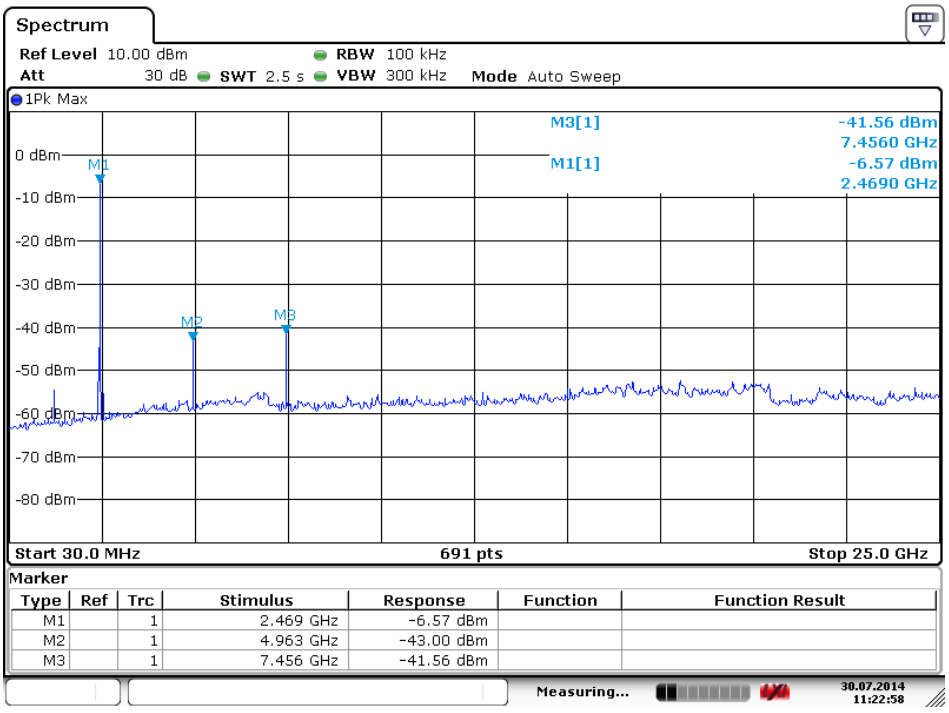
Date: 1.AUG.2014 10:13:50

Middle Channel



Date: 30.JUL.2014 11:21:35

High Channel



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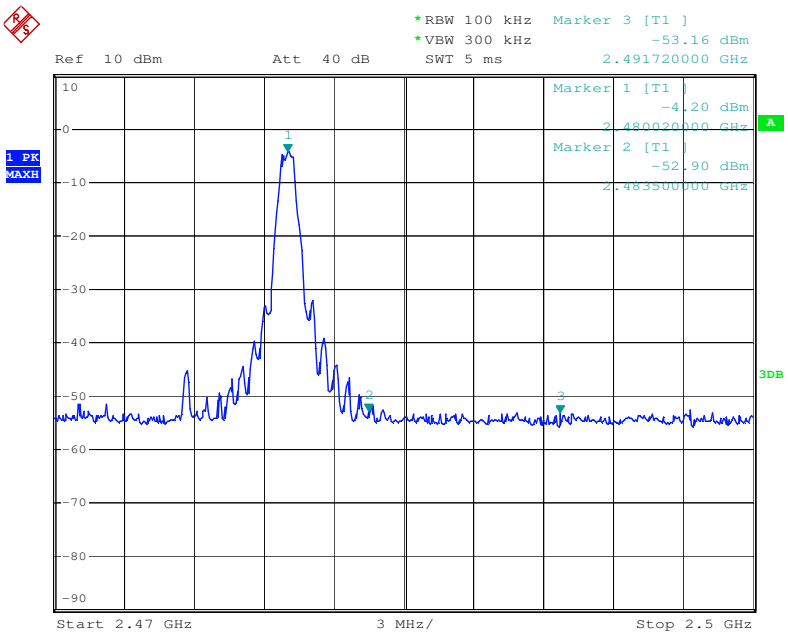
High Channel, Band Edge



Date: 1.AUG.2014 10:12:47

5.1.7 Spurious Emission

RESULT: **Passed**

Date of testing	:	2014-07-30 to 2014-08-05
Test standard	:	FCC part 15.247(d) FCC Part 15.205 RSS-210 Clause 2.2
Basic standard	:	ANSI C63.4: 2003
Limits	:	Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

Remark:
During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions. After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation shown in the test setup photos.
Testing was carried out within frequency range 9kHz to the tenth harmonics.

For details refer to Appendix 1.

5.1.8 Conducted emissions

RESULT: **Passed**

Date of testing	:	2014-08-02
Test standard	:	FCC Part 15.207(a)
Basic standard	:	ANSI C63.4: 2003
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shield room

Test setup

Input Voltage	:	AC 120V, 60Hz via AC input of Notebook
Operation Mode	:	B
Earthing	:	Not connected
Ambient temperature	:	25℃
Relative humidity	:	55%
Atmospheric pressure	:	101 kPa

For details refer to Appendix 1.

5.1.9 Radiated Emission

RESULT: **Passed**

Date of testing	:	2014-09-04
Test standard	:	FCC Part 15 Per Section 15.209(a) Clause 5.5 of ICES-003 RSS-Gen 7.1.4
Frequency range	:	30 - 6000MHz
Classification	:	Class B
Test procedure	:	ANSI C63.4: 2003 CAN/CSA-CEI/IEC CISPR 22-02 RSS-Gen Table 5
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Input Voltage	:	AC 120V, 60Hz via AC input of Notebook
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	Refer to Appendix 1
Relative humidity	:	Refer to Appendix 1
Atmospheric pressure	:	Refer to Appendix 1

Test data refer to Appendix 1.

7. List of Tables

8. List of Photographs

List of Figures

Figure 1: Test figure of spurious emissions, mode A.1, Horizontal polarity (9kHz – 30MHz),

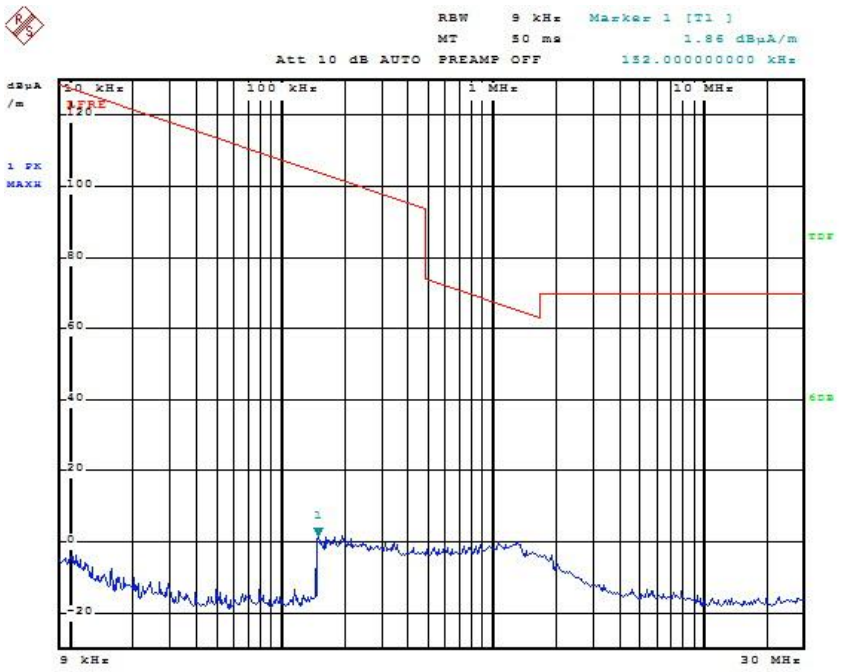


Figure 2: Test figure of spurious emissions, mode A.1, Vertical polarity (9kHz – 30MHz)